SMS/GOES Space Environment Monitor

The Synchronous Meteorological Satellites (SMS-1 and SMS-2) and the Geostationary Operational Environmental Satellites (GOES-1, GOES-2, etc.) all carry on board the Space Environment Monitor (SEM) instrument subsystem. The SEM has provided magnetometer, energetic particle, and soft X-ray data continuously since July 1974.

Geosynchronous satellites have an unobstructed view of the sun for all but the few dozen hours per year when the Earth eclipses the sun. You can identify these intervals as gaps in the X-ray data near satellite local midnight in March-April, and September-October.

The source data for these plots are averages; as a result, the peak values may appear smaller than they actually were.

The volume of these data makes it impossible to issue a guarantee as to the quality of each and every data point. Users should be suspicious of 'spikes' in the data and attempt to correlate them with other sources before assuming that they represent the space environment. The time of these observations has not been corrected for the down-link and preprocessing delay which is within 1 - 5 seconds.

X-ray Sensor (XRS)

Ion chamber detectors provide whole-sun X-ray fluxes for the 0.5-to-3 (0.5-to-4 prior to GOES-8) and 1-to-8 Å wavelength bands. The X-ray sensors may experience significant bremsstrahlung contamination. This contamination is caused by energetic particles in the outer radiation belts and depends on satellite local time, time of year, and the local particle pitch-angle distribution. The X-ray sensors are also sensitive to background contamination due to energetic electrons that either deposit their energy directly in the telescope or strike the external structure and produce bremsstrahlung X-rays inside the ion chambers.

Solar Flares

A solar flare is a short-lived sudden increase in the intensity of solar radiation that originates at or near sunspots. Ground based optical observations are best made at the emission line of Hydrogen known as H-alpha (6563 Å). Thanks to satellite bourn instrumentation, flares can now be observed at X-ray wavelengths (0.1-10.0 Å). Flares are characterized by a rise time of the order of minutes and decay of the order of tens of minutes. The total energy expended in a typical flare is about 10**30 ergs; the magnetic field is extraordinarily high, reaching values of 100 to 10,000 gauss. Optical flares are usually accompanied by radio and X-ray bursts, and occasionally by high-energy particle emissions. The National Geophysical Data Center (NGDC) holds archives for about 80 stations, covering the period 1937 to the present. Currently about 5 stations send their data to NGDC Boulder on a routine monthly basis. The reports are processed and published in the monthly report "Solar-Geophysical Data" and in a different format in the IAU "Quarterly Bulletin on Solar Activity."

X-ray Flare Reports

An X-ray flare officially begins when four consecutive 1-minute X-ray values meet the following conditions:

1. All four values exceed the B threshold (10^{-7} Watts/m^2)
2. All four values are strictly increasing.
3. The last value is 1.4 times greater than the first value.

The X-ray flare classification is based on power per area (Watts/$m^{2)}$ at the time of maximum. A letter value (B, C, M or X) represents the decadal flux value as shown in the data key below. The letter value is followed by a number which tells us the specific intensity of the flare. For example, a flare classified as M3.5 has a peak intensity of $3.5x10^{-5}$ Watts/m^2. The event ends when the flux reading drops below half the sum of the maximum and starting flux.

H-alpha Flare Reports

The basic reports sent monthly from the observatories consist of data for each flare or subflare observation by photographic or visual patrol. The data files give as many of the following measurements as possible: time of beginning; time of maximum brightness; time of any prominent secondary maxima; time of end (all times in UT); area at time of maximum brightness (square degrees of solar disk correct for foreshortening); importance class of flare (IAU 1964 report, updated in 1975); heliographic coordinates of center of gravity of flare at maximum brightness.

Data Key

■	**XL** 1 - 8 Å X-rays (Watts/m^2)
■	**XS** 0.5 – 3 Å X-rays, or 0.5 – 4 Å prior to GOES-8 (Watts/m^2)
|	X-ray and H-alpha flare report start times.
X	X-ray flux > 10^{-4} Watts/m^2
M	X-ray flux 10^{-5} - 10^{-4} Watts/m^2
C	X-ray flux 10^{-6} - 10^{-5} Watts/m^2
B	X-ray flux 10^{-7} - 10^{-6} Watts/m^2

Contact Information

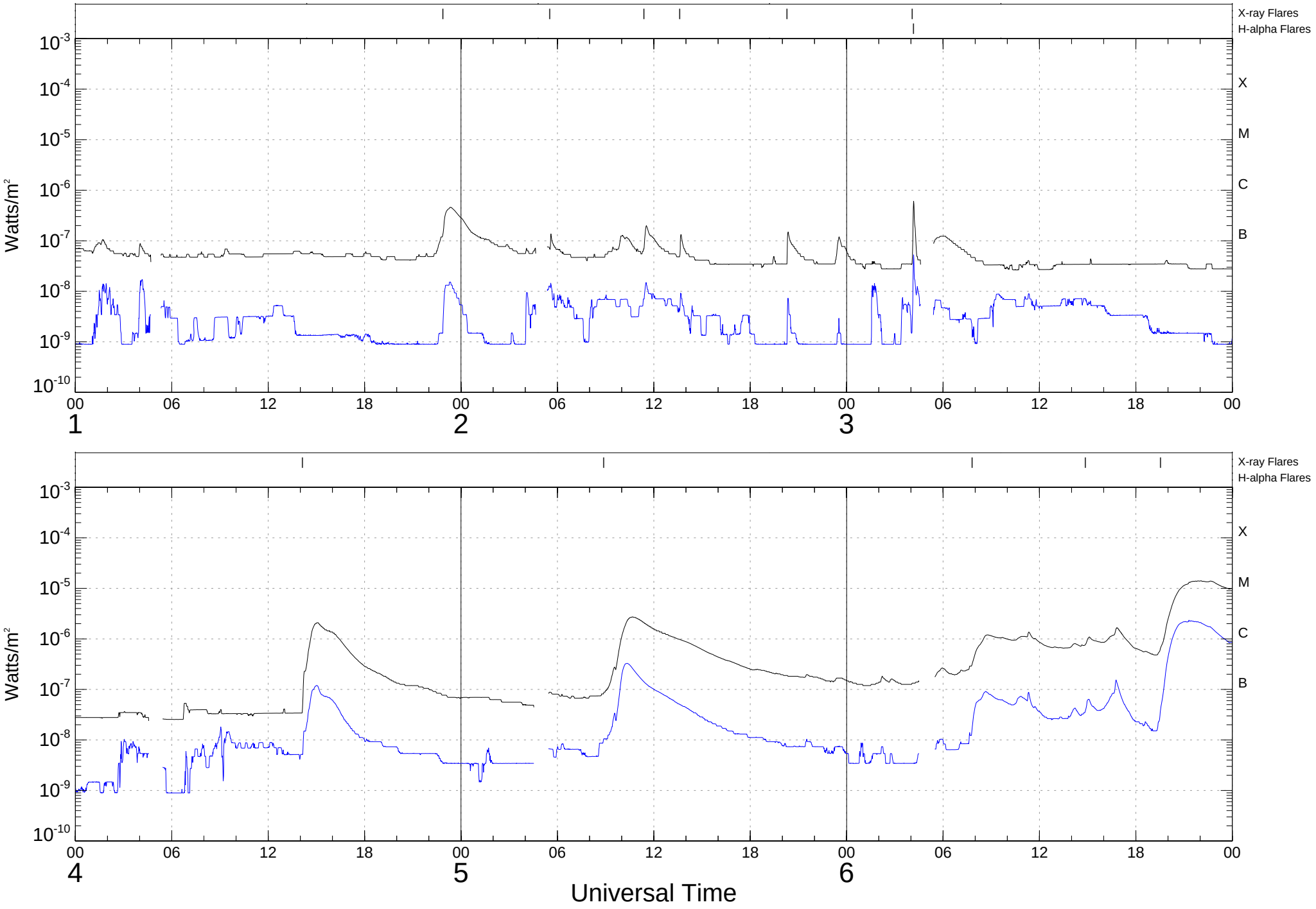
These plots were generated by NOAA's National Geophysical Data Center:
http://www.ngdc.noaa.gov

GOES SEM Data: http://www.ngdc.noaa.gov/stp/GOES/goes.html
Flare Reports: http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarflares.html

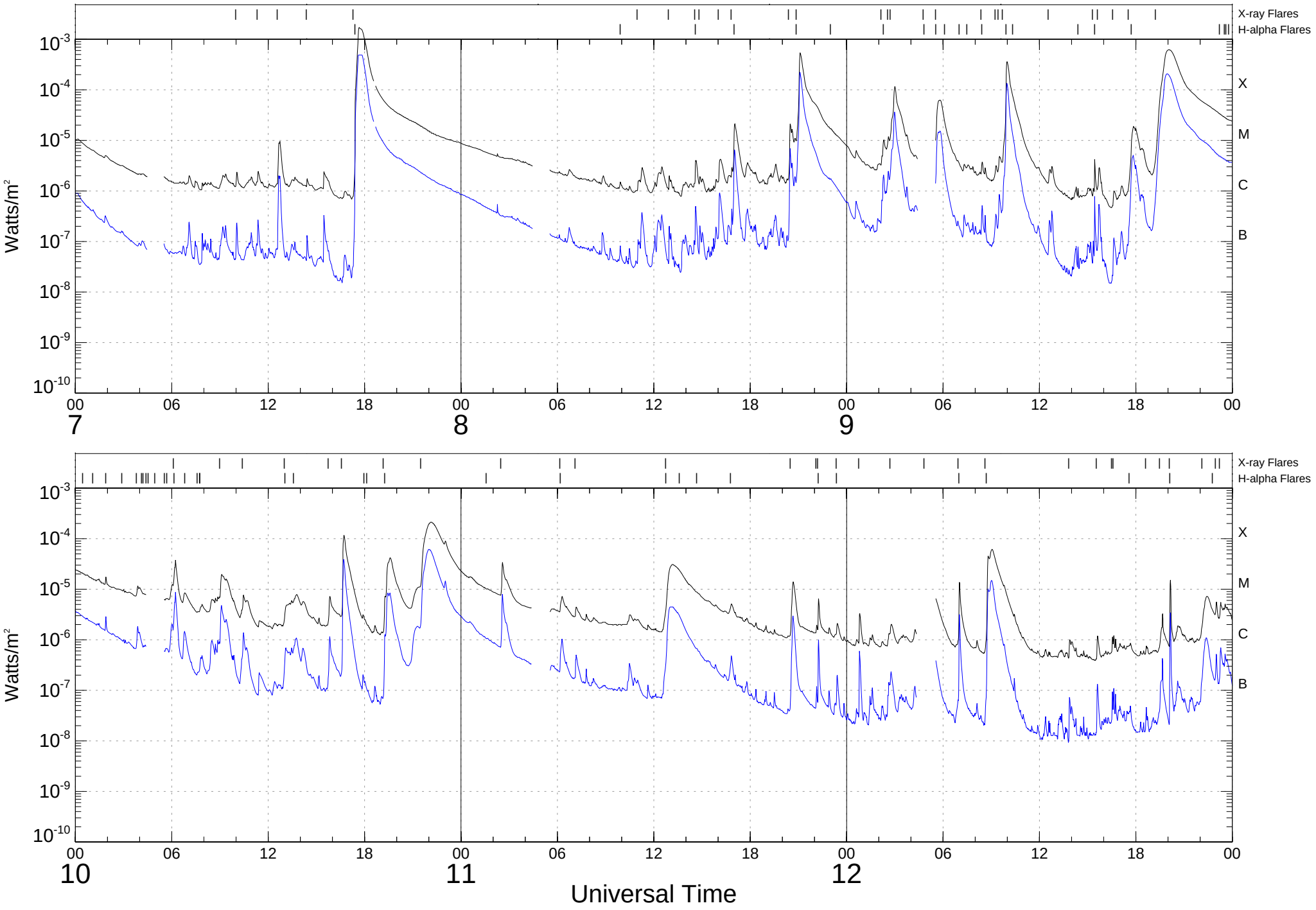
GOES SEM data are processed by NOAA's Space Environment Center:
http://www.sec.noaa.gov/

Address comments to: Daniel.C.Wilkinson@noaa.gov or Helen.C.Coffey@noaa.gov

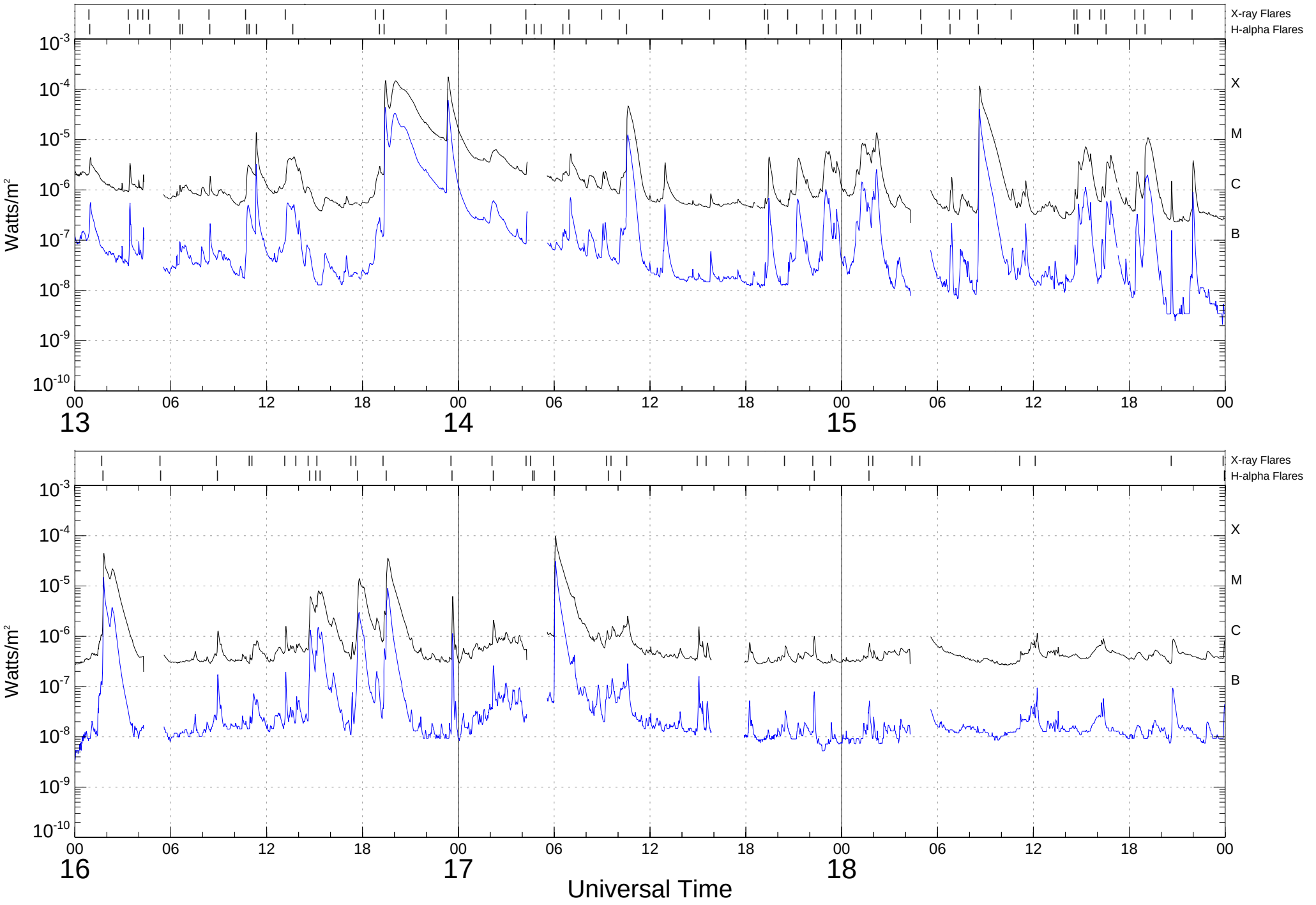
GOES-12 Solar X-Rays (1-Minute Averages)
September 2005



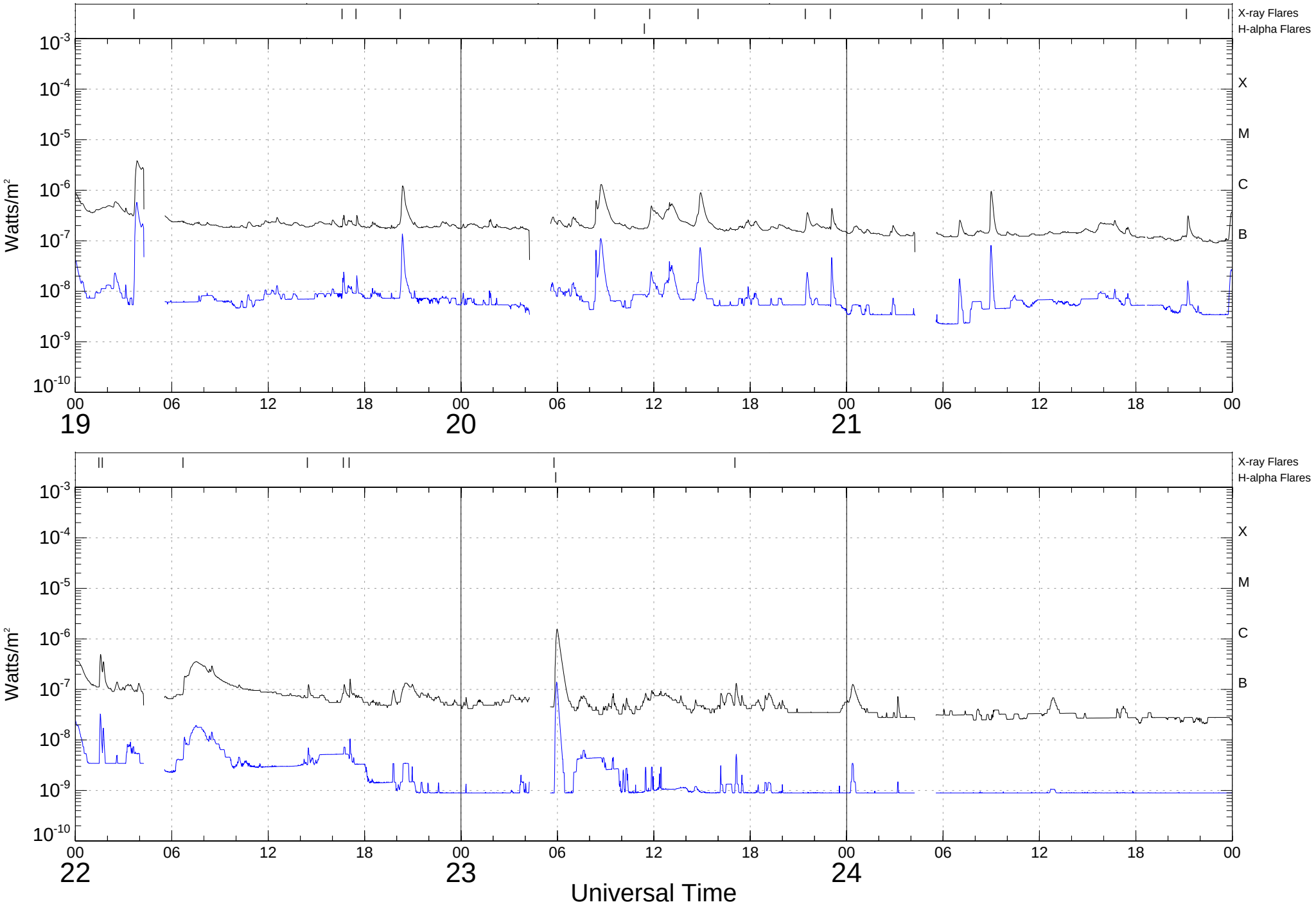
GOES-12 Solar X-Rays (1-Minute Averages)
September 2005



GOES-12 Solar X-Rays (1-Minute Averages)
September 2005



GOES-12 Solar X-Rays (1-Minute Averages)
September 2005



GOES-12 Solar X-Rays (1-Minute Averages)
September 2005